Patent claims

1. A method for navigation during medical interventions on tubular organ structures, characterized in that, before the intervention, static image data of the tubular organ structures are recorded and stored, the tubular organ structures are extracted from the image data and their course is converted into a geometric description used during the medical intervention for instrument/organ recording, and the instrument that is spatially localized by a tracking system is successively corrected in relation to the static data, by a transformation that is preferably defined by an optimization method, taking into account the geometric description and information on the previous distance covered by the instrument, or, conversely, the static data are successively corrected in relation to the instrument position, and thus the position of the instrument is associated with the anatomical structures in the static image data.

2. The method as claimed in claim 1, characterized in that the information on the distance covered represents the continuously recorded spatial position of the instrument.

3. The method as claimed in claim 2, characterized in that only the instrument tip is recorded as the spatial position of the instrument.

4. The method as claimed in claim 2, characterized in that several positions along the instrument are recorded as the spatial position of the instrument.

5. The method as claimed in claim 2, characterized in that the spatial position of the instrument is recorded continuously along the instrument.

6. The method as claimed in claim 1, characterized in that the information on the distance covered contains further features which can in particular represent ramifications of the tubular organ structures or their diameter and which are recorded during the advance of the instrument.

7. The method as claimed in claim 1, characterized in that the transformation shapes the static image data.

8. The method as claimed in claim 1, characterized in that the cyclical movements, which can in particular represent respiratory movements, of the tubular organ structure are calculated from the chronologically changing position of the instrument.

9. The method as claimed in claim 1, characterized in that the movement of the tubular organ structure is computed from the components of the movement of the instrument that are orthogonal to the tubular organ structure.

10. The method as claimed in either of claims 8 and 9, characterized in that the transformation includes the calculated movements of the tubular organ structure.

11. The method as claimed in claim 1, characterized in that, by applying external or internal markers, the movement of the tubular organ structure is recorded and included in the calculation of the transformation.

12. The method as claimed in claim 1, characterized in that the transformation is successively learnt along the distance covered.

13. The method as claimed in claim 1, characterized in that the geometric description represents the central lines of the tubular organ structure.

14. The method as claimed in claim 1, characterized in that the geometric description represents the ramifications of the tubular organ structure.

15. The method as claimed in claim 1, characterized in that the geometric description represents the surface of the tubular organ structure.

16. The use of the method as claimed in one or more of claims 1 through 15 in bronchoscopy interventions.

17. The use of the method as claimed in one or more of claims 1 through 15 as a replacement for angiographic imaging in catheter interventions.

18. The use of the method as claimed in one or more of claims 1 through 15 in the implantation of cardiac pacemakers.

19. The use of the method as claimed in one or more of claims 1 through 15 for positioning of probes.

20. The use of the method as claimed in one or more of claims 1 through 15 for positioning of ablation electrodes.

21. The use of the method as claimed in one or more of claims 1 through 15 for positioning of stents in vessels and bronchi.

22. The use of the method as claimed in one of claims 1 through 15 for checking the position of a catheter.

23. The method as claimed in claim 1, characterized in that a generalized movement model of the tubular structure is taken into account in the calculation the position.

24. The method as claimed in claim 1, characterized in that a generalized movement model of the surrounding tissue of the tubular organ structure is included in the calculation of the position.

25. The method as claimed in claim 1, characterized in that a patient-specific movement model of the tubular structure is taken into account in calculating the position.

26. The method as claimed in claim 1, characterized in that a patient-specific movement model of the surrounding tissue of the tubular organ structure is taken into account in the calculation of the position.

27. The method as claimed in claim 1, characterized in that the recording is successively improved only at certain time intervals.

28. The method as claimed in claim 2, characterized in that other parts of the tubular structure are recorded by registering the instrument position taking into account the calculated cyclical movements as defined in claim 8.

29. The method as claimed in claim 27, characterized in that all the information on the tubular structure is obtained from the recorded and movement-corrected instrument positions and is used as (quasi) static information.

30. The method as claimed in claim 28, characterized in that the collated information can be used at a later time as static information.